desire for more intimate acquaintance with them.

The third book, 'Nature Study and Life' (Ginn & Co.), by Professor C. F. Hodge, belongs to a different class than the other two, being intended for the teacher rather than for the pupil and for the teacher of younger classes. It may be said at once that it is a book which will be welcomed not only by such teachers, but by all who are called upon to find occupation for the busy little fingers and active, eager minds of children. It is a guide to nature study in its best sense and, as President Stanley Hall properly points out in an introduction, it is entirely free from that effeminization which too often detracts from the usefulness of nature study books.

It presents an abundance of just the kind of material a child should study, the fullest and yet most simple methods for facilitating its observation, admirable suggestions for arousing the reasoning faculties concerning it, a wealth of practical application of the knowledge acquired, and running through the whole there is manifest a love of nature for nature's self which cannot fail to impart itself to both teacher and pupil. To describe in detail the contents of the volume is out of the question, but a citation of the headings of some of the chapters will give some idea of its scope: 'Insects of the Household,' 'Insects of the Garden,' 'Beneficial Insects,' 'Elementary Botany,' 'Home and School Gardens,' 'The Propagation of Plants,' 'Our Common Birds,' 'The Domestication of Wild Birds,' 'Elementary Forestry,' 'Aquaria,' 'Flowerless Plants.' And all these and other topics are treated so clearly and suggestively that he who runs may read and have plenty of food for thought when he sits down to rest. Indeed the book possesses a special charm from the freshness and enthusiasm of the author's style, qualities, which, when combined with fascinating photographic reproductions, make the reader forget that he is reading a book and not listening to the author in person discoursing interestingly and convincingly from the fullness of his knowledge.

The information which the book imparts and the training it aims to give are the information and training which educate. For, as the author rightly says: "To do our duty by our neighbors we need a large body of knowledge of the common things that surround the home," and the acquisition of a knowledge of our duty by our neighbors, using that term in the broader Scriptural sense, and an idea of how best to fulfill that duty is the aim of education. Would that this book were in the hands of every teacher of children and every school trustee throughout the land!

J. P. McM.

Irrigation Farming. By L. M. WILCOX. New York, Orange Judd Co. 1902. Pp. 494, pl. 1, figs. 113.

The first edition of this book appeared in 1895. Since that date irrigation farming has rapidly extended in both arid and humid regions and many improvements have been made in methods, as a result of a better understanding of the principles involved. The author in this revised edition in a measure takes cognizance of these advances by adding a number of new sections and four new chapters, namely, seepage and drainage, electricity and irrigation, irrigation in humid climates, and winter irrigation. It is to be regretted, however, that the revision has not been more thorough and included the correction of the numerous inaccurate, and in some cases absurd, statements regarding certain scientific features of the subject, which are left in this edition just as they were in the original edition. The following, relating to the acids of the soil, is an example:

> In all soils we find two essential acids, known scientifically as humic and ulmic. The first is the acid in the humus, or vegetable and animal matter, in the soil. As animal life is built by vegetable matter, it must eventually turn back to vegetable matter. Ulmic acids are those that exude from the roots of some plants. We should remember that nitrogen is the costliest of all plant foods and the most difficult to retain in the soil, and plants must have it, for it corrects this humic acid in the plant as well as in the soil. The ulmic acids are seldom in sufficient quantity to do harm. But the humic acids when shut off from the proportions of nitrogen or potash—both alkalis—become too concentrated, or the dead microbes

become poisonous to plant life, as the great French chemist Pasteur would have it. Now humic acid has the same effect both in plant life and in the soil—for all nature was torn off the same bolt.

While it must not be inferred that the whole book is on a par with the extract quoted, there is enough of such reckless writing in it, especially regarding scientific matters, to render it almost worthless from a scientific standpoint and to impair seriously its usefulness from a practical point of view. W. H. Beal.

SCIENTIFIC JOURNALS AND ARTICLES.

The *Botanical Gazette* for October contains the following papers: Dr. E. B. Copeland concludes his paper on 'The Rise of the Transpiration Stream.' It is based upon a series of experiments conducted by the writer in the Hull Botanical Laboratory. Water moved upward in an artificial 'tree' of plaster of Paris more than forty feet high, but no definite conclusions could be obtained. The paper, therefore, is rather an historical and critical discussion of the subject. The theories which ascribe the rise of water in trees to either the cohesive power of water or the activity of living cells are thoroughly invalid. There is some sound evidence in support of the view that the pressure of the atmosphere forces the water upward. The water travels a large part of the way in a film between bubbles and the wall of the conducting vessels; but the physical properties of such a film are unknown. Not the least valuable part of the paper is the complete bibliography of the subject containing one hundred and seventy-four titles. Mr. W. J. G. Land publishes an account of the essential morphology of *Thuja*, which throws additional light upon the peculiar morphology of the Coniferæ. No ventral canal cell is organized, but its nucleus appears and is not separated from the egg cell by a cell wall. This nucleus remains in the upper part of the egg and may divide and give rise to several nuclei, the group resembling a proembryo. These results make Arnoldi's conclusions in regard to the absence of ventral canal cells in Cupressineæ very doubtful. In the formation of the proembryo eight free nuclei are formed before cell walls appear. Miss Laetitia M. Snow publishes the results of her studies of the ecology of the Delaware coast in the region of Rehoboth Beach. This paper is designed to fill a gap in our knowledge of the vegetation of the Atlantic coast, connecting the work of Harshberger in New Jersey with that of Kearney in Virginia and North Carolina. There is general agreement with their conclusions, as with the work of Cowles on the Lake Michigan dune flora. Several characteristic northern species reach here their southern limit. The formations and character species are the usual ones of dune regions. Dr. J. M. Greenman describes a new western *Camasia* from Washington.

In *The American Naturalist* for September V. L. Kellogg discusses at some length 'The Development and Homologies of the Mouth Parts of Insects' and Carlo Emery furnishes 'An Analytical Key to the Genera of the Formicidæ, for the Identification of the Workers.' C. E. Preston describes some 'Peculiar Stages of Foliage in the Genus *Acacia*' and C. C. Trowbridge considers the subject of 'The Relation of the Wind to Bird Migration,' the author believing that temperature is a less important factor than is usually believed and that wind is more important.

The Popular Science Monthly for October has as frontispiece a portrait of the late Rudolf Virchow. The first article, by J. W. Toumey, is 'A Study in Plant Adaptation,' with special reference to the cholla, *Opuntia fulgida*. O. F. Cook discusses 'The American Origin of Agriculture,' adducing evidence in support of his theory of a westward migration from America to the Pacific Islands. F. A. Woods continues his study of 'Mental and Moral Heredity in Royalty' and John Waddell discusses 'The (Commercial) Competition of the United States with the United Kingdom.' Arthur E. Bostwick offers a study of 'Scientific Reading in a Public Library'; Alja R. Cook describes 'An Ascent of Mt. Orizaba' and David Starr Jordan reviews the various theories of the 'Origin of the Fins of Fishes,' considering that none of them is yet definitely proved. Calvin M. Woodward has a good discussion of 'Domestic and Inter-